DETAILED ACTION

1.   This communication is in response to the Appeal Brief filed on 28 September 2009.

2.   Claims 1, 3-5, 7-10, 13, 15-19 and 25-29 are currently pending. As a result of the Appeal Brief filed 28 September 2009 and the Examiner's Amendment stated below, claims 1, 3-5, 7-10, 13, 15-19 and 25-29 (renumbered as 1-19) are allowed and claims 2, 6, 11, 12, 14 and 20-24 are canceled.

Examiner Amendment

3.   Authorization for this examiner's amendment, listed below, was given in a telephone interview with Scott Stinebruner (Reg. No. 38,323) on 16 December 2009.

In the Claims:

Please amend claims 1, 10, 13 and 25-29 as follows:

1. (Currently Amended) A method for optimizing a database query in a computer of the type including a database management system, the database query including criteria that references a plurality of tables in order to re-order a result set generated for the database query, ~~wherein the criteria is one of a GROUP BY clause and an ORDER BY clause,~~ the method comprising the steps of, in the computer:

applying transitive closure analysis to at least one search condition in the query to identify an equivalent field for a field referenced in the criteria, <u>wherein the criteria is one of a GROUP BY clause and an ORDER BY clause</u>; and

based on the transitive closure analysis, rewriting the criteria to generate

modified criteria to reduce the number of tables referenced thereby by

substituting the equivalent field for the field referenced in the criteria, including

rewriting the criteria to generate modified criteria that references only one table,

based on the transitive closure analysis.

10. (Currently Amended) A method of optimizing a database query in a

computer of the type including a database management system, the database query

including criteria that operates to re-order a result set of the database query and

requires creating a temporary file during operation, ~~wherein the criteria is one of a~~

~~GROUP BY clause and an ORDER BY clause,~~ the method comprising the steps of, in

the computer:

applying transitive closure analysis to at least one search condition in the

query to identify an equivalent field for a field referenced in the criteria<u>, wherein</u>

<u>the criteria is one of a GROUP BY clause and an ORDER BY clause</u>; and

rewriting the criteria, based on the transitive closure analysis, to generate

a modified criteria by substituting the equivalent field for the field referenced in

the criteria, wherein the criteria references a plurality of tables and the modified

criteria references a single table; said modified criteria operating to re-order a

result set of the database query and avoid creating a temporary file during

operation.

13. (Currently Amended) A method for optimizing a database query in a computer of

the type including a database management system, the database query involving a

plurality of join operations and a plurality of search conditions, the method

comprising the steps of, in the computer:

applying transitive closure analysis to the plurality of search conditions in the

query to determine a subset of equivalent search fields;

rewriting a criteria, that operates to re-order a result set of the database

query, to generate a set of respective modified criteria that each reference one or

more equivalent search fields, wherein the criteria is one of a GROUP BY clause

and an ORDER BY clause;

identifying a subset of the respective modified criteria that reference a single,

respective table; and

selecting a join order from among a plurality of join orders for the plurality of

join operations, including analyzing join orders using at least one of the set of

respective modified criteria.

25. (Currently Amended) A program product, comprising:

program code configured upon execution thereof to:

apply transitive closure analysis to at least one search condition in a query

that includes criteria that references a plurality of tables in order to re-order a

result set generated for the query, and based on the transitive closure analysis,

rewrite the criteria to generate modified criteria to reduce the number of tables

referenced thereby, wherein the criteria is one of a GROUP BY clause and an

ORDER BY clause, wherein the program code is configured to apply transitive

closure analysis to identify from the at least one search condition an equivalent

field for a field referenced in the criteria, ~~and~~ wherein the program code is

configured to rewrite the criteria by substituting the equivalent field for the field

referenced in the criteria, and wherein the modified criteria references only one

table; and

  a recordable computer readable medium storing the program code.

26. (Currently Amended) The program product of claim <u>25</u> [[24]], wherein the

program code is further configured to:

run the query according to a join order that is based on the modified criteria.

27. (Currently Amended) A program product, comprising:

program code configured upon execution to:

  apply transitive closure analysis to a plurality of search conditions to

determine a subset of equivalent search fields within a database query involving

a plurality of join operations and the plurality of search conditions, rewrite a

criteria, that operates to re-order a result set of the database query, to generate a

set of respective modified criteria that each reference one or more equivalent

search fields, and select a join order from among a plurality of join orders for the

plurality of join operations by analyzing join orders using at least one of the set of

respective modified criteria, wherein the criteria is one of a GROUP BY clause

and an ORDER BY clause, and wherein the program code is further configured

to identify a subset of the respective modified criteria that reference a single,

respective table; and

      a recordable computer readable medium storing the program code.

28. (Currently Amended) The program product of claim [[22]] 27, further

configured to:

      run the database query according to a join order, the join ordered determined by

selecting one of the set of respective modified criteria.

29. (Currently Amended) An apparatus, comprising:

      at least one processor;

      a memory coupled with the at least one processor; and

      a program code residing in memory and executed by the at least one

processor, the program code configured to apply transitive closure analysis to at

least one search condition in a query that includes criteria that references a

plurality of tables in order to re-order a result set generated for the query, and

based on the transitive closure analysis, rewrite the criteria to generate modified

criteria to reduce the number of tables referenced thereby, wherein the criteria is

one of a GROUP BY clause and an ORDER BY clause, wherein the program

code is configured to apply transitive closure analysis to identify from the at least

one search condition an equivalent field for a field referenced in the criteria,

[[and]] wherein the program code is configured to rewrite the criteria by

substituting the equivalent field for the field referenced in the criteria, and wherein

the modified criteria references only one table.

Reasons for Allowance

4.   The following is an examiner's statement of reasons for allowance:

In the Examiner's Final Office Action dated 27 April 2009, claims 1, 3-5, 9, 10,

13, 15, 18, 19 and 25-29 were rejected under 35 USC 103 based primarily on US

Patent No 6,757,677 to Pham et al; the background of US Patent No 6,662,175 to

Ghazal et al; and "The Bulletin of the Technical Committee on Data Engineering."

The claimed invention is directed towards applying transitive closure analysis to a

search condition in a query, wherein the search query contains a Group By or Order By

clause. Based on the transitive closure analysis of the query, the Group By or Order by

clause is then rewritten in a manner in which the clause references a single table.

The prior art of record, do not show, teach or suggest the combined limitations of

applying transitive closure analysis to at least one search condition in the query

to identify an equivalent field for a field referenced in the criteria, wherein the

criteria is one of a GROUP BY clause and an ORDER BY clause; and based on the

transitive closure analysis, rewriting the criteria to generate modified criteria to

reduce the number of tables referenced thereby by substituting the equivalent

field for the field referenced in the criteria, including rewriting the criteria to

generate modified criteria that references only one table, based on the transitive

closure analysis in combination with the other claimed features.

Pham discloses a query that includes a group by clause, including the concept of

taking the group by clause into consideration when optimizing the join. Ghazal

discloses the concept of applying transitive closure to a query. The Data Engineering

article also discloses the concept of transitive closure. However, none of the prior art of

record discloses the concept of applying the results of the transitive closure to a group

by or order by clause in order to rewrite the group by or order by clause to reference a

single table.

An updated search for prior art on the EAST database and on domains (NPL-

Google and ACM) has been conducted. The prior art searched and investigated in the

database and domains does not fairly teach or suggest the teaching of the claimed

subject matter as described above and reflected by the combined elements in

independent claims 1, 10, 13, 25, 27 and 29. Dependent claims 3-5, 7-9, 15-19, 26 and

28 are indicated as being allowable for the same reasons stated above in regards to the

independent claims.

5.   Any comments considered necessary by applicant must be submitted no later

than the payment of the issue fee and, to avoid processing delays, should preferably

accompany the issue fee. Such submissions should be clearly labeled "Comments on

Statement of Reasons for Allowance."

Contact Information

Any inquiry concerning this communication or earlier communications from the

examiner should be directed to KIMBERLY LOVEL whose telephone number is

(571)272-2750. The examiner can normally be reached on 8:00 - 4:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, John Cottingham can be reached on (571) 272-7079. The fax phone

number for the organization where this application or proceeding is assigned is 571-

273-8300.

Information regarding the status of an application may be obtained from the

Patent Application Information Retrieval (PAIR) system. Status information for

published applications may be obtained from either Private PAIR or Public PAIR.

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USPTO Customer Service Representative or access to the automated information

system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/John R. Cottingham/   /Kimberly Lovel/
Supervisory Patent Examiner, Art Unit 2167   Examiner
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17 December 2009
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18 December 2009